DOCUMENT RESUME

ED 344 652 JC 920 225

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TITLE Operationalizing the Transfer Function.
PUB DATE Jun 92
NOTE 13p.; Paper presented at "Leadership 2000," the Annual International Conference of the League for Innovation in the Community College (4th, Chicago, IL, July 19-22, 1992).
PUB TYPE Reports - General (140) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Academic Achievement; Bachelors Degrees; *College Transfer Students; Community Colleges; *Data Collection; Definitions; Graphs; Higher Education; Intercollegiate Cooperation; Reliability; *Research Methodology; *Statistical Analysis; Two Year Colleges; Validity
IDENTIFIERS *Transfer Rates (College)

ABSTRACT

In statistical terms, transfer rates require two components: a numerator that represents community college students who transfer and a denominator that approximates the pool of potential transfer students. The California Task Force adopted a set of criteria to judge the appropriateness of prospective pairs of numerators and denominators. Its form was a four-pronged methodology that ranked measurement validity across both longitudinal and cross-sectional rates. Specifically, the four issues of validity were as follows: time equivalence; maturation validity; group equivalence; and construct validity. With these measurements at hand, the Task Force proceeded to evaluate a series of rates acquired from various practitioners. Instead of pursuing four different rates, the Task Force opted to restrict the operational definition of transfer students to first-time freshmen at community colleges. Since some students were incorrectly perceived as having transfer potential, and some students with transfer potential could go undetected, the strategy was to devise two transfer rates which represented alternative but complementary points of view. The first rate summarized the transfer activity of first-time freshmen at community colleges who earned a minimum number of six transferable units in their first fall term, while the second rate added the subjective criterion of students who also stated at entry that their educational objective was to transfer. The two longitudinal methods for computing transfer rates were very resistant regarding errors or biases associated with sampling, data collection, and measurement error. (JMC)

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Philip Garcia

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Operationalizing the Transfer Function

Philip Garcia

The literature in higher education offers the following paradox:

> Although many observers believe the tie between two-year and four-year colleges and universities weakened during the 1970s and 1980s (see e.g., Bernstein, 1986, Karabel, 1986, Pincus and Archer, 1989), most experts agree researchers are without adequate definitions or data to convincingly quantify transfer activity for either the past or the present (see *e.g., The Chronicle*, 1990, *The Community College Week*, 1990, Cohen, 1979).

Are these statements compatible? They may very well be. But the more salient question is: How will the contribution of community colleges to the production of bachelor's degrees be assessed in the coming years?

If the current social and political pressures persist, future assessment must include transfer rates. The challenge is to create rates that reflect the flow of community college students to baccalaureate-conferring institutions which are intelligible to a host of interested parties. Needless to say, this is a tall order, especially since existing transfer rates are still shrouded in controversy. To generate informative transfer rates, local, intrastate, or interstate colleges and universities must come together to establish decision rules for prescribing rates, arrive at consensus on methodology, and develop information systems that foster valid and reliable measurement.

After several years of deliberations, California has emerged from just such a process. A task force, made-up of representatives from each segment of higher education, has forged an agreement to calculate statewide transfer rates based on common standards (Intersemental Coordinating Council, 1992). In short, the rates will reflect proportions of students who entered California community colleges each year—with no previous college experience—and later matriculated to campuses of the California State University, University of California, and six of the state's largest independent colleges and universities.

What follows is a case history tracing the path taken by these postsecondary schools. Their shared experience illustrates the many steps and turns that must be negotiated before standardized transfer rates are adopted by a large number of constituents.

Guidelines for a Valid Rate

In statistical terms, transfer rates require two components: i) a numerator that represents community college students who transfer, and ii) a denominator that approximates the pool of potential transfer students. The latter component is the more controversial, since its specification must adjust for the open-admission policy at community colleges which affords access to both collegiate and occupational curricula. On this note, the research literature yields a sparse scattering of flawed examples.

The majority of published transfer rates were produced via secondary analysis; that is, operational definitions of transfer activity were manipulated to accommodate data originally collected for other purposes. Consequently, these rates reflect an assortment of ills that arise when extant data dictate measurement theory. So to escape the sins the of the past, thoughts about established rates or available data must be put on hold until choices are made on what attributes the numerator and denominator should possess.

Keeping all that in mind, the California Task Force adopted a set of criteria to judge the appropriateness of prospective pairs of numerators and denominators. Its form is a four-pronged methodology that ranks measurement validity across both longitudinal and cross-sectional rates. Each checkpoint is founded upon the idea that selecting cogent numerators and denominators is analogous to selecting valid nonequivalent control groups for quasi-experimental designs (Garcia, 1990).

Specifically, the four issues of validity are:

1. *Time equivalence.* Ideally, the numerator and denominator should both have the same year of origin. For example, a low validity score is assigned to any measure where the denominator represents new community college students from the same origin-year, but the numerator represents transfers from multiple origin-years which vary in size or composition.

2. *Maturation validity.* The observation period must allow enough time for students to naturally mature from new entrants to successful transfers. Some established measures erroneously assume most high school graduates enroll at a community college for just two or three years before they matriculate to institutions that confer bachelor's degrees.

3. *Group equivalence.* The rate's numerator and denominator should be based on the same student population. For example, a low validity score is assigned to any measure where the denominator represents the pool of high school graduates who enter a community college with no previous collegiate experience, first-time freshmen, but the numerator represents students who enter community colleges as first-time freshmen or as undergraduates from other colleges or universities.

4. *Construct validity.* The rate should accurately reflect the theoretical concept it is supposed to measure—in this case, the proportion of transfers that emerge from a cohort of new community college students who possess the potential to benefit from pursuing the transfer curriculum. A common problem is to include an unrestricted denominator; that is, no attempt is made to isolate potential transfers from other community college students.

Choosing a Rate

The Task Force, with its yardstick in-hand, proceeded to evaluate a series of rates acquired from various practitioners (e.g.,Berman and Weiler, 1989; Cohen and Brawer, 1990; Lee and Frank, 1990; McIntyre, 1984). And through an iteration process of assessment and modification, it moved forward towards consensus.

Time equivalence. The Task Force's first conclusion was that valid cross-sectional rates could not emerge from existing intersegmental data. Thus the Task Force set its sights on longitudinal rates.

The main problem with cross-sectional rates is that they are affected by population growth, a phenomenon that erodes time equivalence because transfers emerge from cohorts of different sizes. When community college enrollments grow, denominators are artificially larger than their corresponding numerators, and new transfer rates will appear depressed in contrast to prior rates. Naturally, the opposite will be true during periods of declining enrollments. If enrollment growth or decline is random, then a denominator generated from average annual enrollments might work. But patterns of growth or decline usually span several years, so simple averaging may not eliminate the typical time-equivalence problem.

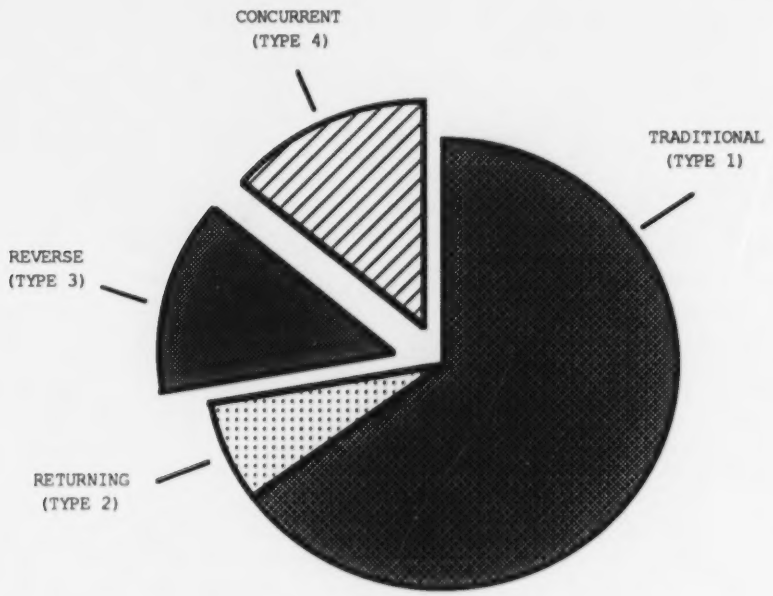

Figure 1 Hypothetical Distribution of Transfers

Observations obtained by tracking cohorts of new community college students across college years guarantee time equivalence. Moreover, the resultant longitudinal rates are much more likely to satisfy the validity requirements of the other three criterion than cross-sectional rates.

Maturation. At this juncture, it was decided that longitudinal measures of the transfer function must represent incidence rates, or the number of new events that occur in a specified time interval. Since there is no documentation on how long it takes most transfers to make the move from community colleges to baccalaureate-conferring institutions, time must be incrementally assessed. The plan is to calculate one-year rates, two-year rates, three-year rates, and so on until the number of transfers from a particular cohort becomes negligible. So, for now, time is unbounded.

Group equivalence. Who are transfer students? To establish group equivalence, this question, must be answered. The traditional view is that they are undergraduate students who entered higher education through the community colleges. Admissions' officers, however, know that transfers come from heterogeneous origins.

Consider the the following four types of students whose enrollment history include both the two-year and four-year sectors:

i) *Traditional transfer:* first-time freshman at a community college.
ii) *Returning transfer:* first-time freshman at a community college.who transferred to a four-year institution, but then returned to a community college.
iii) *Reverse transfer:* first-time freshman at a four-year institution who later enrolled at a community college as an undergraduate.
iv) *Concurrent transfer:* undergraduate who is attending a four-year institution and a community college simultaneously.

Regardless of which categories are defined as transfers, it would not be prudent to aggregate all these groups within one transfer rate. Some Differences in enrollment patterns would surely undermine the attainment of group equivalence.

Instead of pursuing four separate rates, the Task Force's opted to restrict the operational definition of transfer students to first-time freshmen at community colleges. This captures type 1 and type 2 transfers. The primary consideration was numbers. Between 1983 and 1987, an average of 91,000 new first-time freshmen entered California community colleges each fall term. Roughly speaking, they represent 75-85 percent of new entrants who are either California high school graduates with or without collegiate experience. Relatedly, the majority of community college students who matriculate to four-year schools are expected to be type 1 or type 2 transfers (see figure 1).

New priorities or new resources will dictate when rates will be calculated for community college students who begin their higher education careers at four-year institutions in California or enroll concurrently in the two-year and four-year sectors.

Construct validity. Just as the Task Force was aware that no single rate could relate the full story of how the transfer function operates within the state, it was also aware there would not be a single error-free method for identifying all persons with transfer potential from the entire pool of community college students. Invariably, some students are incorrectly perceived as having transfer potential, and some students with transfer potential go undetected (see figure 2). Here, the strategy was to devise two transfers rates which represent alternative, but complementary, points of view.

The first rate (method 1) uses a behavioral criterion to identify potential transfers. The rate summarizes the transfer activity of first-time freshmen at community colleges who earned a minimum number of six transferable units in their first fall term. Earning transferable courses is assumed to reflect transfer aspirations and the aptitude to complete the transfer curriculum.

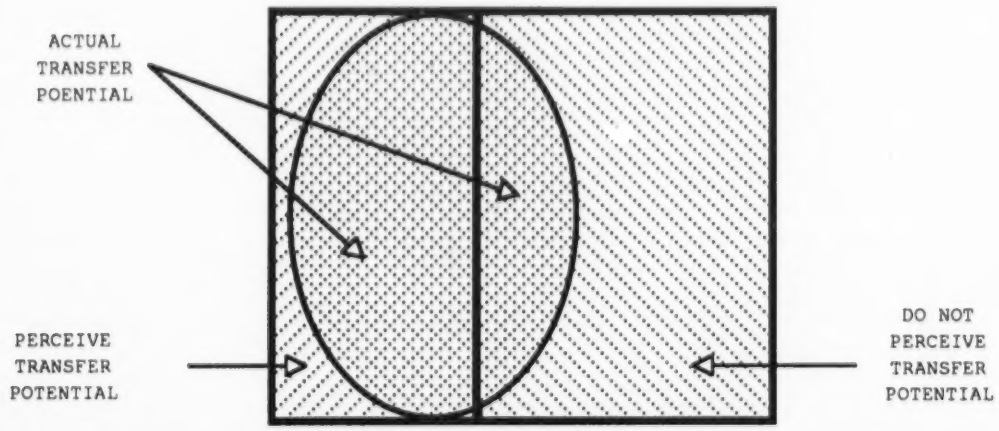

Figure 2 Hypothetical Distribution of Students with Actual or Perceived Transfer Potential

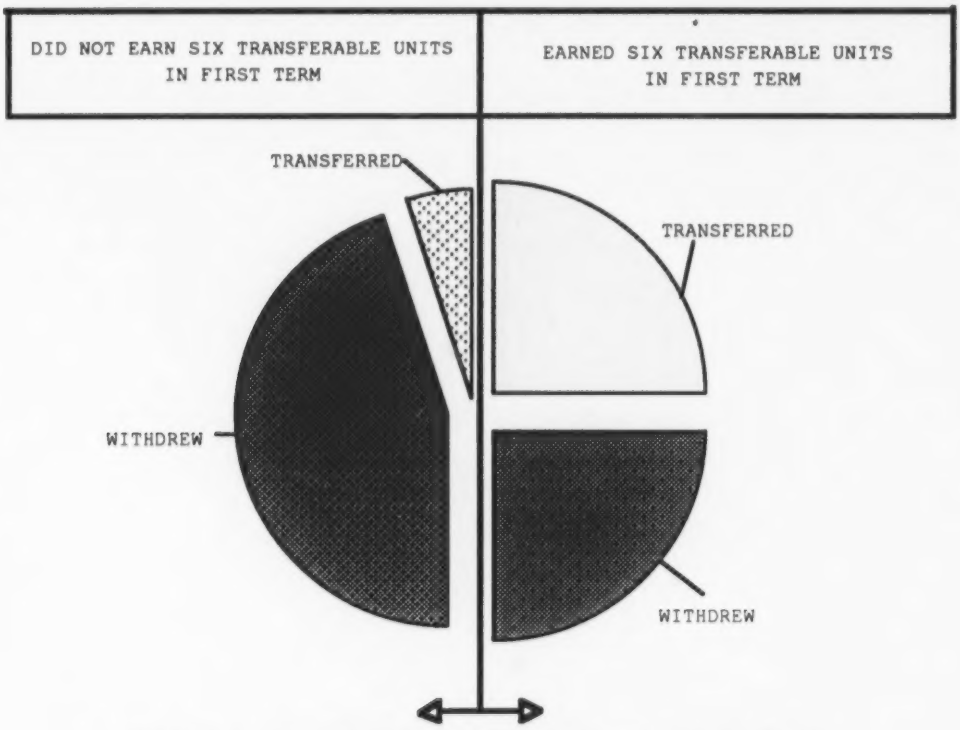

Figure 3 Hypothetical Distribution of Transfers by Units Earned in College First Term

The units-earned cutoff has some empirically basis. For example, data from a recent survey of 22 community colleges across the nation suggest a large number of students—44 percent—leave the two-year sector after one term having earned less than six units (Berman and Weiler, 1989). And at one community college in the sample, the annual proportion of transfers with less than six units was just two percent. Thus the expectation is the units-earned cutoff will be more inclusive than exclusive regarding actual transfers (see figure 3).

The second rate (method 2) adds a subjective criterion. It summarizes the transfer activity of first-time freshmen at community colleges who earned a minimum number of six transferable units in their first fall term *and stated at entry their educational objective was to transfer.* Contrasting these two rates will inform us on how well "intent-to-transfer" isolates transfers from non-transfers. For example, if the denominator for the second rate is significantly smaller than the denominator in the first rate, but the numerators for both rates are based on the same number of observed transfers, then the subjective data would yield the better rate.

Although appealing to many, the second rate will require some internal study. First, unlike the case of units earned, the subjective rate raises the issue of response error. Do all new students properly interpret questions about their intent to transfer? Is "yes" perceived as the more socially acceptable response for queries about intent to transfer? Is intent to transfer even a yes/no issue? Or is intent better described by response categories that imply levels of intensity? Second, there is the issue of causality. If significant numbers of continuing community college students routinely change their minds from "I don't intend to transfer" to "I do intend to transfer," then the argument that transfer intent is causally related to transfer is

weakened; and it might be that accumulation of transferable units is causally related to intent, which in turn is related to transfer. Future analyses will address these issues.

The Transfer Rates

The general computational formula for the two consensus rates is:

$$\frac{\sum_{i=1}^{n} T_i}{C_0}$$

where the denominator *C* equals the prescribed cohort (*i.e.*, either method 1 or method 2) enumerated at fall term: the subscript 0 represents the year of entry, the numerator *T* equals the sum of transfers who emerge in 1 to *n* years, with *n* representing the last year of observed transfer activity.

Having specified two longitudinal methods for computing transfer rates, the issue at hand is: How robust are they to errors or biases associated with sampling, data collection, and measurement error? The answer appears to be: very robust.

Sample error. Seemingly forgotten in the transfer rate controversy is the fact you can judge a whole from a small part. Of course, the part must be representative of the whole. To simplify the tracking procedures, observations are limited to fall entrants. There is no theoretical reason why this subgroup should be a biased sample of the entire population of new students for an academic year. Hence, the standard errors for the rates are equal to the established formula for proportions:

$$S_p = \sqrt{\frac{pq}{N}}$$

where *p* is the proportion of transfers, *q* is the proportion of non-transfers, and *N* is the size of the cohort. The maximum standard error for 1,000, 2,500, and 5,000 students would be 1.6%, 1.0%, and 0.7%, respectively.

Reliability bias. Transfers are determined by electronically matching official records of the California colleges and universities. They are not determined by self-reporting methods. In the past, this procedure has demonstrated a 98 percent accuracy level at the California State University (Guthrie, 1987)

Observation bias. In 1988-89, the state enumerated about 60,000 transfers at California colleges and universities (California Postsecondary Education Commission, 1989). Their distribution was as follows: 75.6 percent at theCalifornia State University,13.6 percent at the University of California, and 10.9 percent at the California Independents.

Since transfer status is not observable for those who transfer to non-participanting California independents, they represent 49 percent of the private colleges population, reported rates could be 96 percent of their true levels for California transfers. If the number of out-of-state transfers is equal to the maximum number of students who might transfer to non-participanting California independents, then the total level of under-reporting could range from 1.1 to 5.5 percentage points, depending on the size of the rate. The following figures illustrate the assumed pattern of variation:

Reported Rate	True Rate	Difference
50.0%	55.5%	-5.5%
40.0%	44.5%	-4.5%
30.0%	33.4%	-3.4%
20.0%	22.2%	-2.2%
10.0%	11.1%	-1.1%

Transfer and Baccalaureate Outcomes

Figure 4 illustrates the kind of information that will emerge from tracking transfer activity among high school graduates who enroll at community colleges. The histogram displays hypothetical enrollment and transfer rates, represented by stacked bars, successive fall terms across a 12-year span, with 0 on the *x*-axis representing year of entry.

The bottom tier displays the proportion of students who transferred in all previous terms. Beginning with year 1, the bars equal the one-year transfer rate, two-year rate, three-year rate and so on, with the last bar representing the eventual transfer rate.

The top tier shows the proportion of students who were enrolled at a community college in the fall term under observation. Community college enrollment are not tracked across all terms in the college year. As a result, the enrollment rates do not reflect uninterrupted attendance. They simply reflect the proportion who were identified as community college enrollments at the beginning of each college year.

Together, these two sets of bars reflect the cumulative proportion of students who *have not withdrawn* from community colleges at the onset of a given year. So, naturally, the missing portion of each stacked bar represents the cumulative withdrawal rate at the onset of a given year.

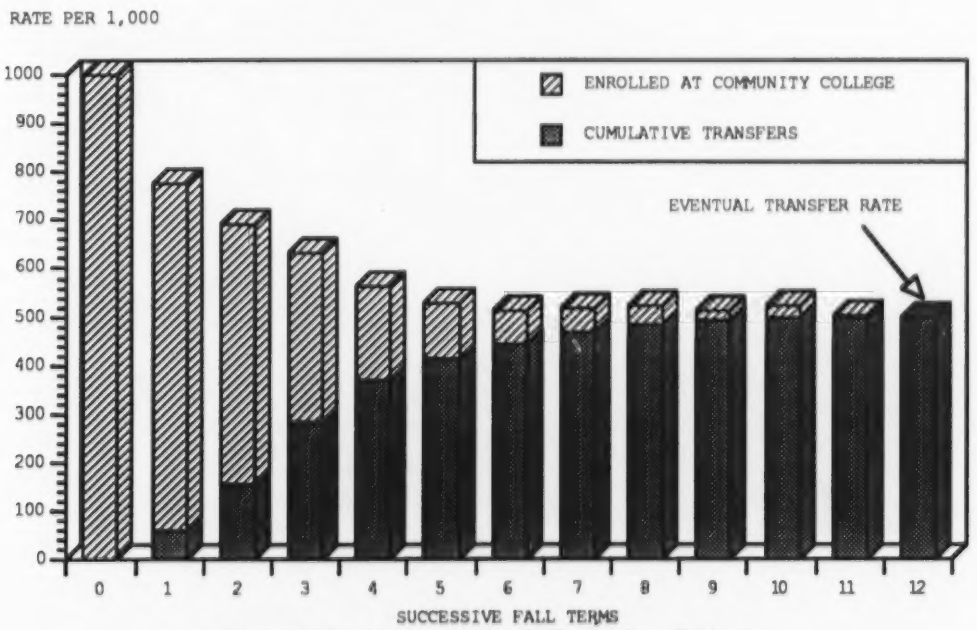

Figure 4 Hypothetical Transfer Rates

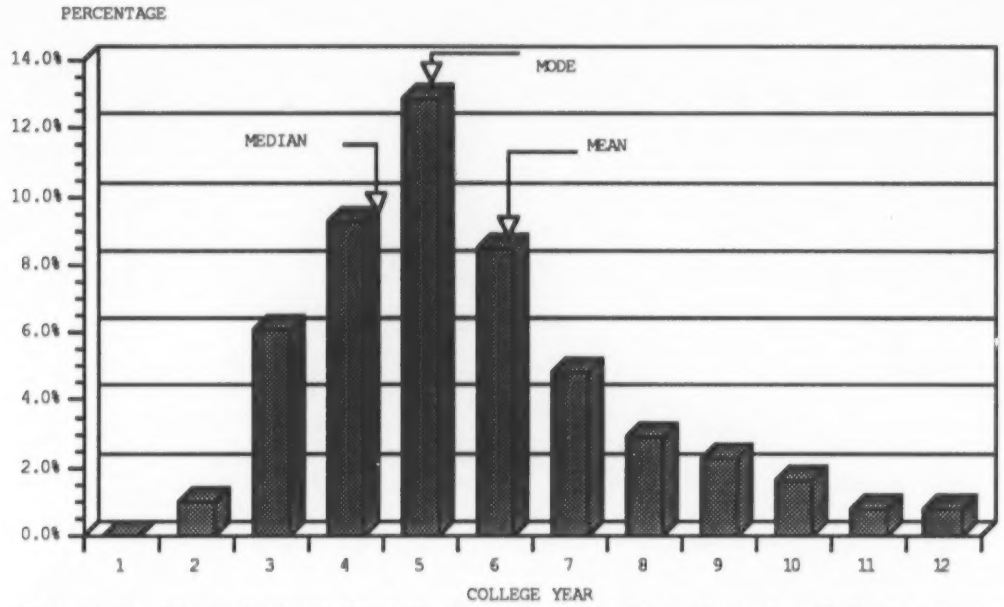

Figure 5 Hypothetical Distribution of New Transfers by College Year

In re-configured states, the data graphed in figure 4 also can reveal many facets about when community college students matriculate to four-year institutions. For example, figure 5 is the corresponding histogram for the relative frequency count for new transfers. This percentage distribution yields the mean, median, and mode regarding time-to-transfer. Other questions that can be answered by the data are: How long do students who do not transfer stay at community colleges before leaving? And, what is the probability of transferring after a given number of years as a community college student?

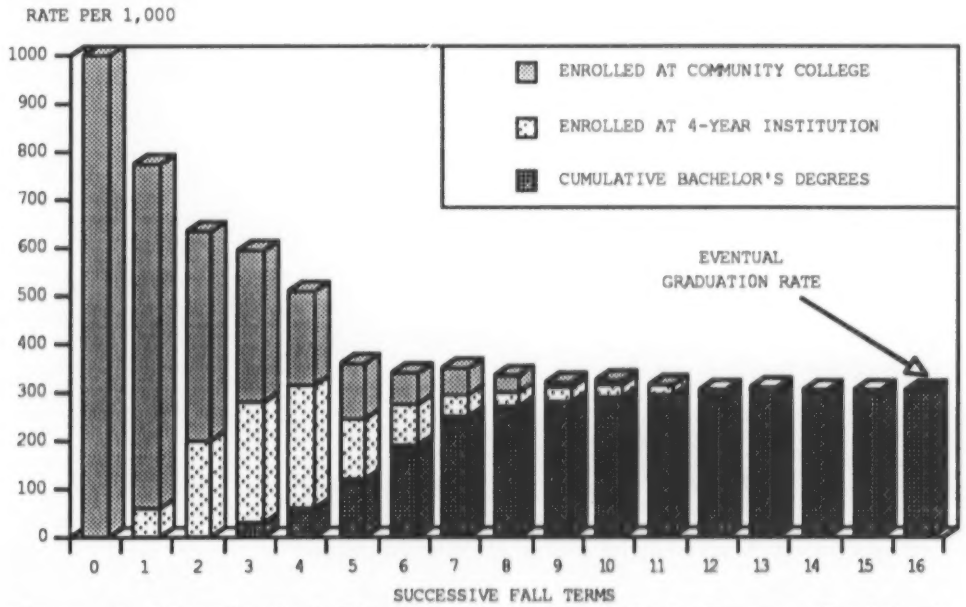

Figure 6 Hypothetical Distribution of Bachelor's Degree Recipients

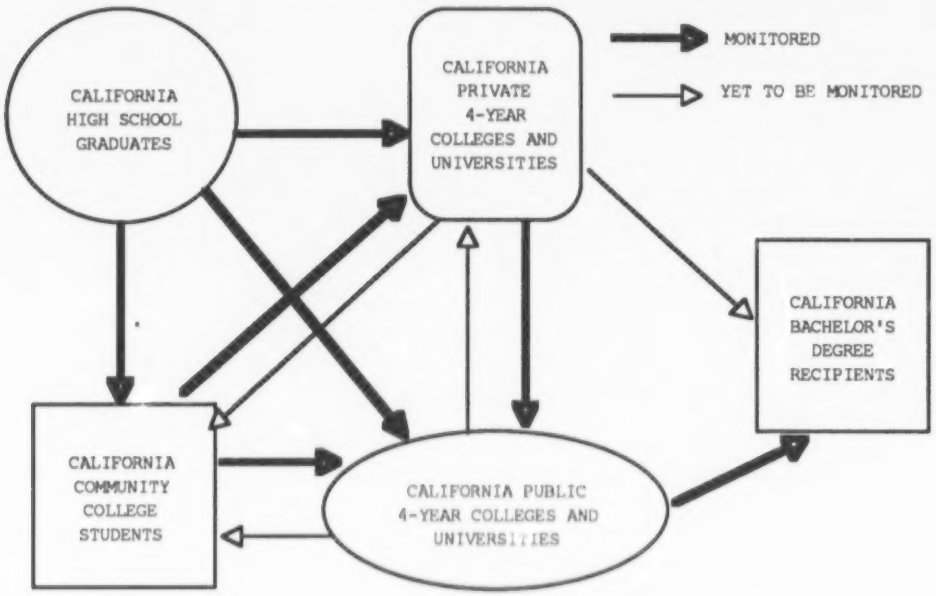
CALIFORNIA HIGH SCHOOL GRADUATES
CALIFORNIA PRIVATE 4-YEAR COLLEGES AND UNIVERSITIES
MONITORED
YET TO BE MONITORED
CALIFORNIA BACHELOR'S DEGREE RECIPIENTS
CALIFORNIA COMMUNITY COLLEGE STUDENTS
CALIFORNIA PUBLIC 4-YEAR COLLEGES AND UNIVERSITIES

Figure 7 Flow Chart of Bachelor's Degree Attainment for California High School Graduates

After community college students matriculate to the four-year sector, they will be tracked through the upper division curriculum. So, for any given year, the proportion of students who are enrolled at a community college, enrolled at a 4-year institution, or attained a bachelor's degrees can be determined (see figure 6). As with the transfer observations, degree attainment will be checked until the numbers become negligible. The sum of the observed degree holders will be the basis for calculating an eventual graduation rate for high school students who enter higher education through the community colleges. And, like before, the data can be rearranged to to display other four-year outcomes, such as average year's of enrollment before withdrawing or the average time lapse between transfer matriclation and earning a bachelor's degree.

Conclusion

Because data collection is an annual event, feedback begins soon after the completicn of the first college year with the calculation of one-year community college continuation rates and one-year transfer rates.date. The expectation is that three-year, four-year, and five-year transfer rates will be very telling statistics.

For the initial years, adding new cohorts from successive fall terms is scheduled to be part of the annual data collection procedure. Thus improtant comparative data will be availble, too, at the earliest possible date. And, in time, they should yield important time series results.

Fully documenting the progress of students from entrance at community colleges to baccalaureate will take some time. For instance, background data for recent cohorts of community college transfers to the California State University, indicate that 50 percent of the group transferred 5.5 years or more after their high school graduation date (California State University, 1992a). And graduation studies suggest 50 percent of these transfers take four years or more to earn degrees (California State University, 1992b). So it appears that completing the lower division transfer curriculum takes just as long (or longer) as completing upper division degree requirements.

When crucial components of the transfer process are finally revealed (see figure 7), researchers and policymakers will be able to better comprehend the flow of California community college transfers to public and private baccalaureate-conferring colleges and universities. Likewise, they will be more able to envision how many of these former community college students earn degrees. And because they will know the distribution of when these events occurred, they should be able to make reasonable forecasts about the future production of such degree holders.

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